

REMARKS

The Office Action mailed July 29, 2004, has been reviewed and Applicants acknowledge with appreciation the indicated allowance of claims 6-9 and 16-27, as well as additional allowable subject matter. By this Amendment, Applicants have amended claims 2, 4 and 10, and have added claims 44-51. Claims 28-41 having been withdrawn by the Examiner in the aforesaid Office Action, claims 2-12, 16-27 and 42-51 are pending in the application. A new Power of Attorney appointing undersigned counsel is also being submitted with this Amendment.

The Examiner objected to the Amendment filed August 8, 2003, regarding the addition of the last sentence in the paragraph beginning at page 13, line 3, because the sentence allegedly introduces new matter into the disclosure of the invention. Applicants traverse this conclusion. The added sentence merely states what those skilled in the art would readily recognize from the existing disclosure. It, therefore, does not constitute new matter.

Next, the Examiner rejected claims 2-5, 10-12, and 42-43 under 35 U.S.C. §112, first para., in view of the added limitation of "outside an electric field" in claims 2, 4 and 10, by the August 8, 2003 Amendment. While it is evident that the processes of the instant application are "outside an electric field", since there is no mention of an electric field in the disclosure and the instant application relies solely on chemical reactions to generate the chlorous acid (and chlorine dioxide), Applicants have deleted

the "outside an electric field" limitation from claims 2, 4 and 10 by the instant Amendment. Therefore, this rejection is moot.

The Examiner rejected claims 2 and 3 under 35 U.S.C. §102(b) as being anticipated by Callerame USP 3,684,437 ("Callerame '437"). Initially, Callerame '437 states in Column 1, Line 44 - 47, that "Since chlorine dioxide absorbed in water forms chlorous acid from which the gas can be readily expelled by heating, chlorine dioxide and chlorous acid are for all practical purposes the same thing." Not only is this statement incorrect from a scientific standpoint, Applicants clearly distinguish between unstable chlorous acid and chlorine dioxide in their instant invention as not equivalent. Chlorous acid is an ionic species made up of hydrogen cation ( $H^+$ ) and chlorite anion ( $ClO_2^-$ ) which form the ionic species  $HClO_2$ . Chlorine dioxide, on the other hand, is a non-ionic dissolved gas in solution.

Callerame '437 further states that in order to form chlorous acid (chlorine dioxide by its definition), sodium chlorite ( $NaClO_2$ ) must be passed through both cation and anion resin. In contrast, Applicants' invention will not work if both cation and anion exchange resins are used together in their process. Rather, as recited in amended claim 2, the unstable chlorous acid is produced with "a cation exchange material in a hydrogen form in the absence of an anion exchange material". Hence, claim 2 as now amended clearly distinguishes from Callerame '437.

Callerame '437 further states that the best results are obtained if the pH of the solution is between 6.2 and 7.0,

preferably between 6.5 and 7.0. In Applicants' invention, it is impossible to make either chlorous acid or chlorine dioxide at this high pH. In fact, the Examples in the instant application for making chlorous acid result in a pH of 1.9, and the pH of the chlorine dioxide solutions average about 2.4, before any additional pH adjustment.

Finally, the anion exchange material of Callerame '437 cannot be considered the "additive" of claim 3 for at least two reasons as discussed above. First, the presence of an anion exchange material is expressly excluded from claim 2 (from which claim 3 depends). And, second, the inclusion of an anion exchange material would destroy Applicants' process and prevent the generation of chlorous acid.

As such, it should be evident that the process of the present invention as recited in claims 2 and 3 is completely different from the process contemplated by Callerame '437.

The Examiner has rejected claims 4 and 5 under 35 U.S.C. §102(b) as being anticipated by Callerame USP 3,828,097 ("Callerame '097").

Callerame '097 is similar to Callerame '437 in that both patents identify the same inventor and assignee. Callerame '097 continues the errors of Callerame '437, where Callerame '097 states in Column 1, lines 33-36, that chlorous acid is merely chlorine dioxide dissolved in water. This is chemically and scientifically incorrect as set forth above in connection with Callerame '437.

In any event, the process of the present invention as recited in claim 4 is clearly different from the process of Callerame '097. More specifically, Callerame '097 requires the presence of a reducing agent, sodium nitrite ( $\text{NaNO}_2$ ), to form the chlorous acid from sodium chlorate. In contrast, a reducing agent is not required to form chlorous acid from sodium chlorate in accordance with the present invention. Furthermore, as discussed previously, Applicants' invention produces unstable chlorous acid, whereas Callerame '097 claims to produce a stable chlorous acid.

Again, the pH ranges in Callerame '097 differ significantly from Applicants' process, as was the case in connection with Callerame '437, the chemical reactions described in Callerame '097 do not balance, and the Callerame '097 process requires heating to obtain chlorine dioxide, which is not necessary for Applicants' process. As such, Applicants' invention stated in claim 4 is patentably different from Callerame '097. Claim 5 is patentable because it depends from an allowable base claim.

The Examiner also rejected claims 2-3 and 42 under 35 U.S.C. §103(a) as being unpatentable over Callerame '437 in view of Kross et al USP 5,100,652 ("Kross"), and claims 4-5 and 43 under 35 U.S.C. §103(a) as being unpatentable over Callerame '097 in view of Kross. Kross makes (column 3, line 9) a "metastable chlorous acid composition formed from relatively small amounts of chlorite and acid." Further, Claim 2 of Kross states that "the chlorite ion concentration in the form of chlorous acid is no more than about 15% by weight of the total amount of chlorite ion concentration."

Applicants' process makes an unstable chlorous acid composition not by acidification but by passing the chlorite through a cation exchanger. For example, the specification at page 10, lines 10-15, states "sodium ion is replaced by a hydrogen ion by means of a cation exchange material, the equilibrium conditions of the solution change, and total acidification of the chlorite salt and/or chlorate salt is possible, thereby making a pure chlorous acid solution." Hence, Applicants' process differs completely from Kross.

Applicants have added new claims 44-50, which depend directly or indirectly from allowable claim 10. As such, these claims are allowable as claims dependent on an allowable base claim and for the additional subject matter contained therein. More specifically, claim 44 recites that the moist environment is an aqueous solution of the chlorate salt precursor. Claim 45 recites the specific catalytic materials recited in the specification as useful in the present invention. Claim 46 recites that the catalytic material is deposited on a suitable substrate to aid the catalysis of the chlorous acid to the chlorine dioxide.

Claim 47 recites the pH range for the aqueous solution of claim 44. This pH range covers the range of pH for the aqueous solutions in the examples disclosed in this specification. As such, no new matter is added. Claims 48 and 49 specify the particular cation exchange materials disclosed in the specification, and claim 50 recites the disinfecting use of the aqueous solution containing chlorous acid and chlorine dioxide in

accordance with the present invention. These claims are therefore also in condition for allowance.

Applicants have also added new claim 51 directed to the purity of the chlorous acid produced by Applicants' process of Claim 2. Support for the purity of Applicants' chlorous acid can be found in the above quoted statement from page 10, lines 10-15 of the specification. The purity of Applicants' chlorous acid distinguishes their process from the prior art. Claim 51 is, therefore, also allowable.

With this Amendment and the foregoing remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any questions or comments, the Examiner is cordially invited to telephone the undersigned attorney so that the present application can receive an early notice of allowance.

Respectfully submitted,

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Atty. Dkt. No.: P66732US0  
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Date: December 16, 2004